On a collection of Fish from the Kameng Frontier Division, N. E. F. A.[1]

BY

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(*With two text-figures*)

Introduction

The fish collection reported in this paper was made by one of us (K. C. J.) during Feb.-June 1961 in the Kameng Frontier Division, North East Frontier Agency, Assam. A few specimens collected by Shri S. Biswas, Assistant Zoologist of this Department, are also included. The description of a new species of Sisoridae is already published (Jayaram 1964).

This report is the first of fish collection made from this area. Chaudhuri (1913) reported on the fish collections from the Abor country, the present Siang Frontier Division, and described a number of new species besides many interesting new locality records. Besides this there appears to be no other paper regarding the fish fauna of the areas of N.E.F.A.

Description of Kameng Frontier Division

The Kameng Frontier Division is one of the five divisions of the North East Frontier Agency of Assam. The Kameng Division was known up to 1954 as the Balipara Frontier Tract. Now named after the principal river, the Kameng or the Bhareli, the division is bordered by Bhutan to the west, the Subansiri Frontier Division to the east, Darrang District of Assam to the south, and Tibet to the

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north. In general the country is mountainous, and divided by countless streams. The height of the various ranges is from *c.* 915 to 5488 metres. The forests are thick and crowded at and near the foothills, but become thinner towards the interior. In general they are of mixed monsoon type tending in places to become subtropical to temperate. Evergreen forests are prominent in the Kalaktang-Domko-Membachur-Bomdila route, whereas towards Dirong-Dzong and Kujjalong they are deciduous, with dry aspects rather conspicuous.

The main drainages are: Norgum Chu[1], Dupla Ko[1], Domko Chu, Tenga, Digien or Tammaphu Chu, Kameng or Bhareli River with the minor tributaries Pangabari Chu, Pobrang Chu, Sangti, Chug, and Milankang. Besides these, countless small nullahs and streams, seasonal and perennial, occur: all with swift, cold, clear water flowing over rocks, boulders, and pebbles. Excepting at a few places as in the valleys of Moshing, Shergaon, Siggon, Dirong-Dzong, Naphra, the streams are turbulent and fishing is practised only by means of traps.

Methods of Tribal Fishing

The tribal people of this division are of various clans: the Monpas, Sherdukpens, Buguns, Akas, Mijis, Bangnis, Daflas, and Sulungs. Though some of them are influenced by Buddhism, all of them are good fishermen, and have devised indigenous traps, nets, lures, and poisons to catch fish. Every tribe and every village has streams over which it claims fishing rights. Fishing besides being a search for food is sometimes a religious activity involving strict taboos. Bones of big fishes (*Labeo* sp., *Oreinus* sp.) are occasionally hung up in some tribal houses. The catch is meticulously divided and distributed according to certain traditional rules. Fishing by outsiders is resented, but once our intention of scientific pursuit was made known they willingly co-operated. In many instances this was achieved by the courteous and appropriate gesture of handing over about half of the catch for their use and consumption.

The tribals do not have any reservations regarding the fish species for their table. Fish dried and fresh are eaten, and some houses have special iron racks above the hearths for drying fish. Drying is adopted because of the large quantity of fish collected rather than by reason of any special liking. Since fishing is often a ceremonial enterprise undertaken by the whole community, a large quantity is netted. Preparation of fish pastes and other fish by-products are not known.

[1] 'Chu' and 'Ko' are tribal words to denote river.

Fishes are generally collected by cast netting the shallow rock pools and rivers where the current is slow, and by means of trapping. The methods adopted are as below:

(*a*) *Organised Community Fishing.* On certain fixed days when fishing is planned, either due to religious ceremony or culinary need of the community, the village headman sends out advance information regarding the time and place of fishing by drum-beat. Almost the entire village folk including women and children turn out at the fishing site. A suitable site is selected on the river, narrow and permitting a diversion to be cut. The diversion, or a *nullah*, should be about 2 to 3 metres wide and sloping so as to allow the water from the main stream to flow through it. It is connected back to the main river 180 to 270 metres down stream, thus not allowing the water to go waste. Dead tree trunks, bushes, and branches are thrown across the main river to serve as anchorage for the dam. Big boulders are also used to serve as supports. At an interval of about 3 metres three vertical poles tied in the form of a tripod stand are erected and anchored to the bed of the river by heavy stone weights. Tarpaulin is stretched across this skeletal support. The upper ends of the tarpaulin are secured to the tripod stands.

The main stream below the dam having thus become partly dry, is now vigorously searched for fish. Leaves and roots of *Maesa indica* Wall., known as a fish poison, are used. The roots are crushed like a brush and inserted beneath big stones and boulders to benumb the fish. Species of *Glyptothorax*, *Euchiloglanis*, *Amblyceps*, *Olyra* were removed by hand from beneath such boulders and rocks. Species of *Oreinus*, *Noemacheilus*, *Barilius*, etc. were collected from small rock pools and shallow water pits. The tribals dash the head of the fish on rocks to kill it. The entire stretch from below the dam to the place where the diversion joins the main stream is searched. The whole community joins in collecting the fish. Only fishes are taken and the large number of tadpoles, frogs, trichopteran insects, and insect larvae are discarded. Before leaving the area, the dam and obstructions are removed and the stream returned to its original course. The tribals believe that after such fishing there will be no fish available in that stretch of the river for another fortnight.

(*b*) *Trapping.* This is practised only in small streams and where the flow is fast and torrential. The trap is spindle-shaped in appearance and is made of strong bamboo splinters. The splinters are tied in such a way that the two ends are open and a constriction

is made at the centre. One open end is placed in between the boulders facing the water current. Fishes are caught at the constriction and remain alive because of the stream of water flowing out through the other end. *Pseudecheneis sulcatus* was caught by one such trap.

In some places, instead of the spindle cage remaining open at both ends, the splinters are cut in such a way that they are separate only for about $\frac{3}{4}$ths of the length of the bamboo. The basal portion remains intact and hollow, serving as a receptacle for fish.

(*c*) *Shooting with bow and arrow.* Some tribals use sharpened bamboo splinters as arrows and shoot fish. This is practised only at shallow portions of the river, and where the water is clear. They are fairly accurate shots though the quantity of fish obtained is small. The arrow heads are not poisoned.

Systematic list of the collection

Order CYPRINIFORMES

Division Cyprini

Family CYPRINIDAE

Subfamily (i) RASBORINAE

1. *Barilius bendelisis* (Hamilton)
2. *Danio aequipinnatus* (McClelland)

Subfamily (ii) CYPRININAE

3. *Accrossocheilus hexagonolepis* (McClelland)
4. *Labeo dero* (Hamilton)
5. *Labeo dyocheilus* (Hamilton)
6. *Labeo* sp.

Subfamily (iii) GARRINAE

7. *Garra lamta* (Hamilton)
8. *Garra nasutus* (McClelland)

Subfamily (iv) SCHIZOTHORACINAE

9. *Oreinus plagiostomus plagiostomus* (Heckel)

Subfamily (v) COBITINAE

10. *Noemacheilus beavani* Günther
11. *Noemacheilus corica* (Hamilton)
12. *Noemacheilus rupecula rupecula* (McClelland)

Division SILURI

Family AMBLYCEPIDAE

13. *Amblyceps mangois* (Hamilton)

Family OLYRIDAE

14. *Olyra longicaudata* (McClelland)

Family SISORIDAE

15. *Glyptothorax gracilis* (Günther)
16. *Euchiloglanis hodgarti* (Hora)
17. *Euchiloglanis kamengensis* Jayaram
18. *Pseudecheneis sulcatus* (McClelland)

Order PERCIFORMES

Family ANABANTIDAE

19. *Anabas testudineus* (Bloch)

NOTES ON SOME SPECIES

Danio aequipinnatus (McClelland)

1839. *Perilampus aequipinnatus* McClelland in *Asiat. Res.* **19** (2) : 393, t. 60, f. 1 (type-locality, Assam).

1941. *Danio aequipinnatus*, Hora & Nair in *Rec. Indian Mus.* **43** : 371 (notes on synonymy).

MATERIAL

LOT A. 4 examples, 18 mm. to 68 mm. in standard length, Belsiri River, Foothills, 213 m. alt., 27 Feb. 1961.

LOT B. 1 example, 30 mm. in standard length, Norgum River, 3 km. south of Amatulla village, 762 m. alt., 8 Mar. 1961.

LOT C. 50 examples, 12 mm. to 66 mm. in standard length, from a rock pool of Norgum River below Bitselling village, 915 m. alt., 16 May 1961.

LOT D. 4 examples, 44 mm. to 62 mm. in standard length, Norgum River below Ankaling village, 610 m. alt., 17 May 1961.

LOT E. 1 example, 38.5 mm. in standard length, Jhomri Chu at Bairabkunda, 274 m. alt., 20 May 1961.

This species is widely distributed in India, Ceylon, Burma, and Siam. There seems to be no account of the developmental stages of this species giving its juvenile features. We have in our collection a series of 50 examples under Lot C ranging from 16 mm. to 75 mm. in total length which show the growth stages and the variations. These are given below:

Stage 1. 16 *mm. total length.* Eyes large and dark. Lower jaw projecting slightly beyond upper jaw. Dorsal and anal fins fully

differentiated. Pectoral fins partly differentiated. No trace of pelvic fins. Yolk sac not fully absorbed. Chromatophores scattered all over body. A thin black band along centre of body starting only from below dorsal fin insertion; a thick black band over dorsal profile from occiput to dorsal fin base. Lateral line not seen.

Stage 2. 19 *mm. total length.* Eyes small and dark. Lower jaw fitting into upper jaw. All fins well differentiated. Yolk sac completely absorbed. Coloration same as in previous stage. Lateral line not seen.

Stage 3. 25 *mm. total length.* Central black band broader and thicker towards caudal fin, extending from near operculum. A black spot on opercular angle. Black band on dorsal profile from occiput to dorsal fin base faded. Sensory pores on lower jaw seen. Lateral line not seen.

Stage 4. 34 *mm. total length.* Central black band uniformly broad all over. A second lateral black band below the central band extending to anal fin. Occiput black, and band on dorsal profile faded. Opercular spot present. Sensory pores better developed. Lateral line very thinly seen. Branching of dorsal fin rays commences and five branched rays seen.

Stage 5. 39 *mm. total length.* Central black band anteriorly broad and tapering posteriorly; second black lower band extending to anal fin. Pale yellowish ground colour of body in between central and lower black band extending as a broad conspicuous streak. Another pale-yellow streak also seen above central black band. Opercular spot faded. Occiput black. Black band over dorsal profile interrupted. Sensory pores well developed. Lateral line faintly seen.

Stage 6. 45 *mm. total length.* Central dark band darker posteriorly than anteriorly; lower dark band extending to caudal fin base. Intervening lower pale yellowish streak broken above pectoral fin to form a pale yellowish spot. Upper pale yellowish streak slightly faded. Opercular spot conspicuous. Occiput dark. Black streak over dorsal profile continuous to dorsal fin base. Sensory pores well developed. Lateral line clearly seen.

Stage 7. 54 *mm. total length.* Coloration nearly as in previous stage. Bands well formed; three black and white alternating bands. A thin black tinge extends below dorsal fin. Gill membranes forming an inverted U-shaped notch ventrally. Sensory pores well developed. Lateral line clearly seen.

Stage 8. 75 *mm. total length.* Bands completely formed. Central dark band extending to median seven rays of caudal fin. Pale yellow spot above pectoral fin present. Opercular spot diffused. Black

streak over dorsal profile and black colour over occiput both diffused to dull grey of body colour. A black tinge below dorsal fin present. Lateral line clearly seen.

Certain body measurements and counts are given in Table I.

TABLE I

CERTAIN BODY MEASUREMENTS AND COUNTS OF *DANIO AEQUIPINNATUS*

Stage	Total length in mm.	Body depth in mm.	Least depth of caudal peduncle in mm.	Fin Ray Counts			
				A	C	D	
						Br.	Simple
1	16	6	3	11	11	..	5
2	19	4	1.5	13	15	..	7
3	25	6	3	13	19	..	7
4	34	8	4	13	19	5	5
5	39	9	4	14	19	5	5
6	45	11	5	14	20	6	5
7	54	12	6	13	19	7	5
8	75	16.5	8	13	21	10	2

Some authors (Weber & Beaufort 1916; Myers 1952; Hora & Mukerji 1934) have divided the genus *Danio* into two subgenera, *Danio* and *Brachydanio*, based on the number of branched dorsal fin rays. *Brachydanio* is used for species with 7-branched dorsal rays and an incompletely or absent lateral line, whereas *Danio* is used for species with 12- to 16-branched dorsal rays and a complete lateral line. Smith (1945, p. 95) stated that a sharp line of differentiation cannot be drawn between these two subgenera on the basis of these variable characters. The developmental stages described above also indicate that such a division is not justified.

Accrossocheilus hexagonolepis (McClelland)

1839. *Barbus hexagonolepis* McClelland in *Asiat. Res.* **19** : 270, 336, t. 41, f. 3 (type locality, Upper Assam).

1940. *Barbus* (*Puntius*) *hexagonolepis*, Hora in *J. Bombay nat. Hist. Soc.* **42** : 81 (systematic position).

MATERIAL

LOT A. 3 examples, 116 to 145 mm. in standard length, Belsiri River, Foothills, 213 m. alt., 27 Feb. 1961.

LOT B. 1 example, 137 mm. in standard length, Norgum River, 1.6 km. below Bokhar village, 254 m. alt., 14 March 1961.

LOT C. 6 examples, 41 to 48 mm. in standard length, from a rock pool of Norgum River below Bitselling village, 915 m. alt., 16 May 1961.

LOT D. 17 examples, 44 to 186 mm. in standard length, Norgum River below Ankaling village, 610 m. alt., 17 May 1961.

The 'Katli' of the Nepalese and 'Bokar' of the Assamese, *A. hexagonolepis* is a widely distributed species and perhaps the commonest large-scaled barbel of Assam and the eastern Himalayas. Formerly placed under the subgenus *Lissochilus* of the genus *Barbus* (*Puntius*), these fishes are characterised by the separation of the lower lip into two lateral parts, exposing the median portion of the lower jaw; the preorbital and suborbital regions have horizontal rows of pores which may be tuberculated. The name *Lissochilus* being preoccupied, Oshima (1919) proposed the name *Accrossocheilus* for these fishes regarding which Smith (1945, p. 197) pointed that the availability of the name 'depends on the acceptance of the view that the various types of lower lip in this group (whether entire, slightly notched, or completely divided with the two halves moderately or widely separated) represent simply intergrading stages of the same structural feature'. Hora (1940, p. 81), while reasoning for keeping these fishes under the separate subgenus *Lissochilus*, stated that these fishes are similar to those of the subgenus *Tor*, in which the condition of the lips is subject to great variation. Usually forms living in shallow torrential streams have hypertrophied lips and those living in clear fast-flowing torrents have thick lips (see Hora 1939 for further details). Hora has shown that the varied pattern of the lips is due to the different habitats in which these fishes may live and that they are only intergrading stages of one basic norm. In the material under study, most of the specimens have an entire lower lip and a few specimens have slightly notched to nearly entire condition. In view of these reasons, we feel that these fishes should be kept under a separate genus *Accrossocheilus* pending a revision of the *Barbus*-group of fishes.

In the material under report the dorsal fin is inserted in advance of the pelvic fin insertion; the pectoral fin in most cases does not extend to the pelvic fin, but in some young examples it reaches the pelvic base. There are two rows of well-formed tubercles on the snout. They extend from below the nostrils to below middle of orbit. In the young specimens the tubercles appear like skin swellings

and later with growth become wart-like and spinous. They occur in a more or less linear arrangement and are found in both sexes.

Labeo sp.

MATERIAL

LOT A. 50 examples, 15 to 23 mm. in standard length, Norgum River, 3 km. south of Amatulla village, 762 m. alt., 8 March 1961.

LOT B. 2 examples, 19 and 25 mm. in standard length, from a rock pool of Norgum River below Bitselling village, 915 m. alt., 16 May 1961.

LOT C. 10 examples, 13.5 to 19 mm. in standard length, from a small stream in Chug River valley, 2134 m. alt., 25 July 1961, S. Biswas coll.

LOT D. 40 examples, 12.5 to 23 mm. in standard length, from the Dupla Ko, 6 km. SW. of Siggon, 1829 m. alt., 29 August 1961, S. Biswas coll.

The specific determination of these specimens is difficult. All of them represent a single species. The main characters are as below:

D. 11 or 12; P. 14 or 15; V. 7 or 8; A. 5; C. 19 to 21

Body compressed; dorsal profile arched. Lips thin and plain. Labial fold interrupted. A thin groove over snout. A pair of minute maxillary barbels. Body covered with numerous irregularly distributed black dots. A black streak along centre of body and a conspicuous dark blotch at caudal base. Scales large, about 23 present. Caudal fin forked and with pointed lobes.

Describing the coloration of *Labeo fimbriatus* (Bloch) Day (1878, p. 536) stated: 'Sometimes a diffused dark blotch at the base of the caudal, and which is almost invariably present in the young'. The distribution of *fimbriatus* extends from Sind, Punjab, NE. Bengal, and Deccan to Orissa. We are unable to identify our material with *fimbriatus* in spite of their similarity in colour pattern, for want of adult specimens. The report of Alikunhi *et al.* (1949) does not deal with the post-larval growth stages of this species nor does Alikunhi (1957, p. 30) mention the presence of any black spots on the caudal fin base.

Garra nasutus (McClelland)

1838. *Platycara nasuta* McClelland in *J. Asiat. Soc. Bengal* **7** (2): 947, t. 4, f. 2, 2*a*, 2*b* (type locality, Kashi Hills).

1921. *Garra nasutus*, Hora in *Rec. Indian Mus.* **22** : 655.

MATERIAL

LOT A. 27 examples, 24 to 40 mm. in standard length, from a rock pool of Norgum River below Bitselling village, 915 m. alt., 16 May 1961.

LOT B. 12 examples, 49 to 79 mm. in standard length, Jhumri Chu near Bhutan border with Bairabkunda, 275 m. alt., 20 May, 1961. (Slightly damaged specimens.)

Hora (1921) gave a description of some young specimens from Manipur and Sikkim. The juvenile specimens under Lot A agree well with Hora's description. The larger specimens under Lot B were picked up from a stream which was drying.

Oreinus plagiostomus plagiostomus (Heckel)

1838. *Schizothorax plagiostomus* Heckel, *Fische aus Cashmir* 16, t. (type locality, Kashmir).
1936. *Oreinus plagiostomus*, Mukerji in *Mem. Conn. Acad.* **10** : 347.
1949. *Oreinus plagiostomus*, Misra in *J. zool. Soc. India* **1** : 39, t. 1, f. 1 & 2.

MATERIAL

LOT A. 45 examples, 33 to 63 mm. in standard length, Belsiri River, Foothills, 213 m. alt., 17 February 1961.

LOT B. 2 examples, 115 and 129 mm. in standard length, Norgum River, 1.6 km. below Bokhar village, 854 m. alt., 14 March 1961.

LOT C. 8 examples, 56 to 101 mm. in standard length, Norgum River, Kalaktang, 1372 m. alt., 22 March 1961.

LOT D. 7 examples (damaged), 51 to 104 mm. in standard length, Dupla Ko, Shergaon, 2012 m. alt., 28 March 1961.

LOT E. 2 examples, 46 and 64 mm. in standard length, Dupla Ko., 1.6 km. south-west of Shergaon, 1829 m. alt., 29 March 1961.

LOT F. 19 examples, 52 to 107 mm. in standard length, from a stream at 6 km. north to Rupa, of the Dikong Ko, 2134 m. alt., 3 April 1961.

LOT G. 33 examples, 31 to 110 mm. in standard length, Dupla Ko, 5 km. north-west of Shergaon, 1829 m. alt., 5 May 1961.

LOT H. 2 examples, 81 and 92 mm. in standard length, Dupla Ko, 5 km. south-west of Shergaon, 2134 m. alt., 6 May 1961.

LOT I. 4 examples, 35 to 47 mm. in standard length, from a rock pool of Norgum River below Bitselling village, 915 m. alt., 16 May 1961.

LOT J. 3 examples, 100 to 126 mm. in standard length, from Dupla Ko at lower Siggon village, 2000 m. alt., 4 May 1961.

LOT K. 2 examples, 85 and 165 mm. in standard length, from a small tributary of Norgum River, 1.6 km. north of Ankaling village, 758 m. alt., 26 May 1961.

LOT L. 4 examples, 51 to 63 mm. in standard length, Dikong Ko, 6 km. north of Rupa, 2134 m. alt., 3 April 1961.

LOT M. 1 example, 78 mm. in standard length, from a small tributary of Chug River, 2134 m. alt., 25 July 1961, S. Biswas coll.

Considerable variation exists in this species. Misra (1949) clarified its specific limits. Mukerji (1936) had differentiated *O. sinuatus* and *O. plagiostomus* by the nature of the dorsal spine, shape of the lower lip, development of the anal scales, and the length of the caudal fin lobes. Misra (1949) stated that there are no valid differences between these two species 'except in the presence in *O. plagiostomus* and absence in *O. sinuatus* of the "pearl organs" and indicated that *O. sinuatus*, so far considered as a separate species, is only the female form of

O. plagiostomus'. Silas (1960) agreeing with Misra synonymized *sinuatus* with *plagiostomus*. The material under report is interesting in respect of these characters. The variations are discussed below:

1. *Dorsal spine.* In general the serrations on the dorsal spine are found only along the lower half of the inner margin and in most specimens they are feeble. Juveniles, however, have a smooth spine. About 31% of the material has the serrations comparatively stronger and these could be referred to as *sinuatus* as per Mukerji's diagnosis.

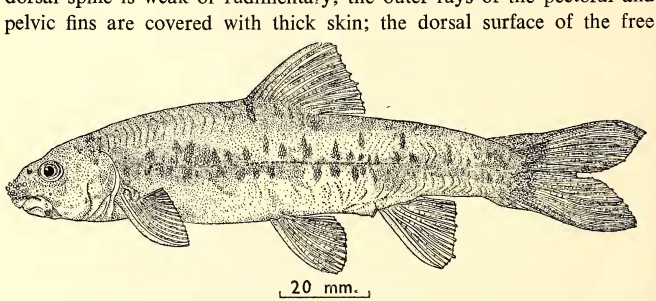
2. *Lower lip.* There is no uniformity in the shape of the lower lip. Only about 19% of the material has the margin of the lower lip somewhat straight. Even amongst those with curved margin of the lower lip, variations from a slightly concave to nearly straight types are seen.

3. *Caudal fin lobes.* Only 101 specimens have undamaged caudal fin. Amongst these the majority have the lobes equal. About 18% only have unequal lobes.

4. *Pearl Organs.* Both sexes have these tubercles. However, only about 76% of individuals which had these tubercles could be referred to Misra's diagnosis of *plagiostomus*.

From the above analysis, it is evident that excepting the nature of the serrations on the dorsal spine, the other characters are not significant to separate *sinuatus* from *plagiostomus*.

The material under Lots J, K, and L perhaps represents the extremes of the range of variability of this species. In all these, the dorsal spine is weak or rudimentary; the outer rays of the pectoral and pelvic fins are covered with thick skin; the dorsal surface of the free



Text-fig. 1. *Oreinus plagiostomus plagiostomus* (Heckel)
Lateral view of a specimen from Lot L, showing the extreme range of variation

portion of the lower lip is beset with many small tubercles as in *Labeo dero*; the scales on the body are sparsely distributed being faintly visible only above the pectoral and near the base of the caudal fin and are apparently absent at other places (Text-fig. 1). The material was thought to represent a hybrid population of *O. plagiostomus* and

Labeo dero, but the extreme variability and the great intergradation of the body features with *plagiostomus* led us to consider it otherwise. Comparison of certain proportions and counts of these specimens with the other material of *plagiostomus* is given in Table II below and the frequency distribution of the fin ray counts in Table III.

TABLE II

COMPARISON OF THE BODY PROPORTIONS AND COUNTS OF TWO LOTS OF *O. PLAGIOSTOMUS PLAGIOSTOMUS*

Characters	Lots A to I N=13		Lots J, K, & L N=9	
	Range	Mean	Range	Mean
Standard length/Head length..	4.11 to 5.00	4.52	4.47 to 5.39	4.83
Standard length/Post-dorsal length ..	1.75 to 1.90	1.79	1.67 to 2.03	1.91
Standard length/Body depth ..	4.58 to 5.40	4.88	4.19 to 5.37	4.58
Standard length/Longest caudal ray ..	3.79 to 4.26	3.99	3.69 to 4.78	4.25
Head length/Eye ..	3.60 to 4.37	4.07	4.00 to 5.07	4.44
Head length/Pect.-Pelvic fin distance ..	0.37 to 0.43	0.41	0.57 to 0.76	0.68
Interorbital width/Eye ..	1.20 to 1.75	1.51	1.54 to 2.15	1.78
Snout/Eye ..	1.50 to 2.00	1.72	1.66 to 2.61	2.13
Dorsal fin rays ..	11	—	9 to 11	—
Pectoral fin rays ..	17	—	16 to 17	—
Pelvic fin rays ..	9	—	9 to 10	—
Lateral line scales ..	98 to 100	—	98 or 99	—

TABLE III

FREQUENCY DISTRIBUTION OF CERTAIN FIN RAY COUNTS IN TWO LOTS OF *O. PLAGIOSTOMUS PLAGIOSTOMUS*

Lots	Fin Rays (Total branched and simple)										
	Dorsal			Pectoral			Pelvic		Caudal		
	9	10	11	15	16	17	9	10	18	19	20
A to I and M ..	—	29	11	2	3	25	10	30	12	28	—
J, K, and L ..	1	—	8	—	5	4	6	3	—	8	1

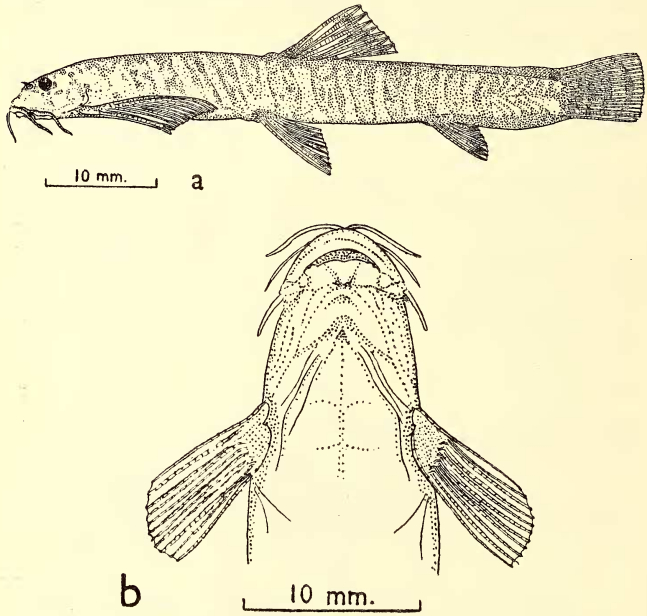
From the comparative tables and analysis some significant differences between the two lots are seen in respect of the position of the eye, and counts of dorsal and pelvic fin rays. However, when statistically analysed the differences are not significant to warrant any taxonomic recognition.

Noemacheilus beavani Günther

1868. *Nemacheilus beavani* Günther, Cat. Fish. Brit. Mus. **7**: 350 (type locality, Kosi River).
1935. *Nemacheilus beavani*, Hora in *Rec. Indian Mus.* **37**: 63, t. 3, f. 11.
1962. *Nemacheilus beavani*, Motwani, Jayaram, & Sehgal, in *Trop. Ecol.* **3**: 23.

MATERIAL

3 examples, 42 to 46 mm. in standard length, from a rock pool of Norgum River, below Bitselling village, 915 m. alt., 16 May 1961.



Text-fig. 2. *Noemacheilus beavani* Günther

a. Lateral view of a specimen showing the diffused bands; *b*. Ventral view

The three specimens under report, though agreeing with Hora's (1924) description differ in respect of the colour bands. The

characteristic feature of this species is that the vertical bands are broad and fewer in number. Usually about nine dark-grey bands are present with a dark band at the caudal fin base. In our specimens about 12 dark grey bands are seen of which nine towards the posterior are well formed, the anterior three tending to become diffused and slanted. Some of the bands are not fully dark grey, but have vertically oval loop-like areas at the centre through which the basic body colour of olive-yellow is seen. The caudal fin has about three > shaped bands which are not clear in some specimens. There is a dark spot at the top corner of the caudal band, and a dark blotch along the base of the dorsal spine. The specimen illustrated here (Text-fig. 2) represents the extreme form of variation wherein the bands are much diffused.

Noemacheilus corica (Hamilton)

1822. *Cobitis corica* Hamilton, Fish. Ganges : 359, 395 (type locality, Kosi River).
1962. *Noemacheilus corica*, Motwani, Jayaram & Seghal, in *Trop. Ecol.* **3** : 24.

MATERIAL

4 examples, 15.0 to 16.5 mm. in standard length, from a small stream in Chug River valley, 2134 m. alt., 25 July 1961, S. Biswas coll.

N. corica is known from Punjab, NE. Bengal, and Assam. This is the first record of this species from the eastern Himalayas. Though the specimens are juvenile, the diagnostic colour spots, and the elongation of the third and fourth pectoral fin rays are distinctly seen. There are 11 or 12 black blotches along middle of the side and above the pale olive body and also a black spot at the base of the caudal fin.

Noemacheilus rupecula rupecula (McClelland)

1838. *Schistura rupecula* McClelland in *J. Asiat. Soc. Bengal* 7 : 948, t. 55, f. 3 (type locality, Simla).

MATERIAL

One example, 52 mm. in standard length, from the Dupla Ko, 6 km. south-west to Siggon, 1829 m. alt., 29 August 1961, S. Biswas coll.

McClelland described *Schistura rupecula* from 'mountain streams at Simla'. The species was characterised as having about 14 broad

bars on either side, and three across the caudal and dorsal fins; the dorsal fin with eight rays, and the anal fin with seven rays. The illustration accompanying the description indicates clearly 14 vertical colour bands and also the absence of any nasal barbels. The species is widely distributed in the Himalayas.

Günther (1869) referred five specimens from Sikkim to this species and described the coloration as: 'Body with fourteen or fifteen cross bands, broader than the interspaces between them.' He described the nasal appendage as very distinct.

Hora (1935, p. 58) having examined the five specimens of Günther stated that they are identical with hundreds of specimens collected at different places below Darjeeling. Owing to the presence of a distinct nasal barbel in the eastern Himalayan examples, Hora (op. cit.) separated them as a new variety of *N. rupecula* and named it as *inglisi*. However, while discussing the fish fauna of the Naga Hills, Hora & Mukerji (1935, p. 400) referred 21 specimens to *N. rupecula sensu stricto* thereby extending the range of distribution of the species to the eastern Himalayas also. Thus, both forms of *rupecula*, viz. *rupecula s. s.* and *rupecula inglisi* are found in the eastern Himalayas; the latter taxon restricted only to accommodate specimens with a distinct nasal barbel.

The specimen collected from the Dupla Ko agrees with Günther's description except that it has no nasal barbel and is therefore referable to *rupecula rupecula*. The coloration is slightly different. The body is uniformly deep olive with 14 dark grey bands, each broader than the spaces between it and the neighbouring bands. A distinct, but faint, black spot is also present at the base of the dorsal fin. The last band near the caudal fin base is in the form of a large irregular-shaped blotch. The bands on the caudal and dorsal fins are faint. In specimens from the Kumaon Himalayas, the ground colour is pale yellow and the bands are brown in colour, and slightly narrower than in the example under report.

Amblyceps mangois (Hamilton)

1822. *Pimelodus mangois* Hamilton, Fish. Ganges : 199, 379 (type locality, Nathpur, Kosi River).

1933. *Amblyceps mangois*, Hora in *Rec. Indian Mus.* **35** : 617.

MATERIAL

One example, 53 mm. in standard length, from Belsiri River, Foothills, 213 m. alt., 27 Feb. 1961.

The species exhibits a very wide range of variability in regard to the shape of the caudal fin, the length and shape of the adipose dorsal

fin, and the position of the anal papillae. In the specimen under report, the upper lobe of the caudal fin is slightly prolonged; the caudal fin furcate; the adipose dorsal fin free from the caudal fin, long and narrow, and the anal papillae situated nearer the bases of the pelvic fins.

Olyra longicaudata McClelland

1842. *Olyra longicaudata* McClelland in *Calcutta J. nat. Hist.* **2** : 588 (type locality, Khasi Hills, Assam).
1936. *Olyra longicaudata*, Hora in *Rec. Indian Mus.* **38** : 204.

MATERIAL

Two examples, 73 and 91 mm. in standard length, Belsiri River, Foothills, 213 m. alt., 27 Feb. 1961.

The systematic position of this fish was elucidated by Hora (1936). Though six species have been described under *Olyra*, only *longicaudata* is well known from a large number of specimens collected at the base of the Darjeeling Himalayas, Assam, and Tenasserim. All the species are distinguished by the number of anal fin rays. The count given by Hora for *longicaudata* is 23 (loc. cit. p. 204) whereas in the two specimens examined by us, the count is only 16. However, in respect of other features they agree with the description.

Glyptothorax gracile (Günther)

1864. *Glyptosternum gracile* Günther, Cat. Fish. Brit. Mus. **5** : 186 (type locality, Nepal).
1923. *Glyptothorax gracile*, Hora in *Rec. Indian Mus.* **25** : 25.
1954. *Glyptothorax gracile*, Menon in *Rec. Indian Mus.* **52** : 48.

MATERIAL

LOT A. One example, 65 mm. in standard length, Belsiri River, Foothills, 213 m. alt., 27 Feb. 1961.

LOT B. One example, 107 mm. in standard length, Norgum River, 3 km. south to Amatulla village, 762 m. alt., 8 March 1961.

The material under report agrees well with the published description of the species. However, the granulations on the head and the body are not clearly seen in fresh specimens because of the mucous covering. The serrations on the inner margin of the dorsal spine are very feeble. The coloration of the smaller specimen is noteworthy. The dorsal fin and the adipose dorsal fin are tipped black. A diffused large black spot is also present on the caudal fin base. On either side of the body below the dorsal spine a dull white spot is present. The larger specimen on the other hand is uniformly dark-grey.

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Summary

This paper lists 19 species of fishes collected from the Kameng Frontier Division, N.E.F.A., and contains taxonomic accounts of eleven of them. The fishing methods practised by the tribals of this area are also discussed. Notes on the systematic position, variations, and geographic distribution of some species are also given.

References

Alikunhi, K. H. (1957) : Fish culture in India. *Farm Bull.* No. **20**, pp. 144. Indian Council of Agricultural Research, New Delhi.

— — —, Ganapati, S. V., & Rao, S. N. (1949) : Notes on the life history of *Labeo calbasu* and *L. fimbriatus*. *Proc. Indian Sci. Congr.* **36** : 159.

Chaudhuri, B. L. (1913) : Zoological results of the Abor expedition. Fish. *Rec. Indian Mus.* **8** : 243-257.

Day, F. (1878) : The Fishes of India ; being a natural history of the fishes known to inhabit the seas and freshwaters of India, Burma and Ceylon : 778, 198 pls., London, William Dawson & Sons, Ltd.

Günther, A. (1869) : Catalogue of fishes in the British Museum **7**: xx + 512. London.

Hora, S. L. (1921) : Indian Cyprinoid fishes belonging to the genus *Garra* with notes on related species from other countries. *Rec. Indian Mus.* **22** : 633-687.

— — — (1924) : Fish of the Siju Cave, Garo Hills, Assam. *Rec. Indian Mus.* **26** : 27-31.

— — — (1935) : Notes on fishes in the Indian Museum. XXIV. Loaches of the genus *Nemachilus* from Eastern Himalayas with the description of a new species from Burma and Siam. *Rec. Indian Mus.* **37** : 49-67.

— — — (1936) : Siluroid fishes of the genus *Olyra* McClelland. *Rec. Indian Mus.* **38** : 202-207.

— — — (1939) : The game fishes of India. VIII. The Mahseers or the large-scaled Barbels of India. I. The Putitor Mahseer, *Barbus* (*Tor*) *putitora* (Hamilton). *J. Bombay nat. Hist. Soc.* **41** : 272-295.

— — — (1940) : The game fishes of India. XI. The Mahseers or the large-scaled Barbels of India. IV. The Bokar of the Assamese and Katli of the Nepalese, *Barbus* (*Lissochilus*) *hexagonolepis* McClelland. *J. Bombay nat. Hist. Soc.* **42** : 78-88.

— — —, & Mukerji, D. D. (1934) : Notes on fishes in the Indian Museum. XXII. On a collection of fish from the S. Shan States and the Pegu Yomas, Burma. *Rec. Indian Mus.* **36** : 123-138.

— — — — — — — — — (1935) : Fish of the Naga Hills, Assam. *Rec. Indian Mus.* **37** : 381-404.

Jayaram, K. C. (1964) : A new sisorid fish from the Kameng Frontier Division, N.E.F.A.—*J. zool. Soc. India* **15** (1).

Misra, K. S. (1949) : A note on the systematic position of two Cyprinoid fishes of the genus *Oreinus* McClelland from Kashmir. *J. zool. Soc. India* **1** (1) : 39-40.

Mukerji, D. D. (1936) : Yale North India Expedition. 18. Report on fishes. Part 2. Sisoridae and Cyprinidae. *Mem. Conn. Acad. Sci., New Haven* **10** : 325-359.

Myers, G. S. (1952) : *Danio* or *Brachydanio*, *Barbus* or *Puntius* ? *Aquarium J., Philadelphia* **23** : 121-122.

Oshima, M. (1919) : Contributions to the study of the freshwater fishes of the island of Formosa. *Ann. Carnegie Mus. Pittsburg* **12** : 169-328, 6 pls.

Silas, E. G. (1960) : Fishes from the Kashmir Valley. *J. Bombay nat. Hist. Soc.* **57** (1) : 66-77.

Smith, H. M. (1945) : The freshwater fishes of Siam or Thailand. *U. S. nat. Mus. Bull. Washington* **188** : xi + 622.

Weber, M., & Beaufort, L. F. (1913) : Fishes of the Indo-Australian Archipelago **2** : xiii + 404. E. J. Brill Ltd., Leiden.

— — — (1916) : Fishes of the Indo-Australian Archipelago **3** : xv + 455. E. J. Brill Ltd., Leiden.